

NVIDIA CUDA-X Libraries

NVIDIA CUDA-X, built on top of NVIDIA CUDA, deliver dramatically higher performance compared to CPU-only alternatives across multiple application domains.

Math Libraries

GPU-accelerated math libraries lay the foundation for compute-intensive applications. Some of the libraries are:

- **cuBLAS:** GPU-accelerated basic linear algebra (BLAS) library
- **cuFFT:** GPU-accelerated library for Fast Fourier Transforms
- **CUDA Math Library:** GPU-accelerated standard mathematical function library
- **cuTENSOR:** GPU-accelerated tensor linear algebra library
- **cuRAND:** GPU-accelerated random number generation (RNG)

Parallel Algorithm Libraries

GPU-accelerated libraries of highly efficient parallel algorithms for several operations in C++.

- **Thrust:** GPU-accelerated library of C++ parallel algorithms and data structures

Image and Video Libraries

GPU-accelerated libraries for image and video decoding, encoding, and processing that leverage CUDA and specialized hardware components of GPUs.

- **nvJPEG:** High-performance GPU-accelerated library for JPEG decoding
- **NVIDIA Performance Primitives:** Provides image, video, signal processing functions
- **NVIDIA Video Codec SDK:** To encode and decode video on Windows and Linux.
- **NVIDIA Optical Flow SDK:** To compute the relative motion of pixels between images.

Communication Libraries

Performance-optimized multi-GPU and multi-node communication primitives.

- **NVSHMEM:** OpenSHMEM standard for GPU memory, with extensions for improved performance on GPUs.
- **NCCL:** Open-source library for fast multi-GPU, multi-node communications that maximizes bandwidth while maintaining low latency.

Deep Learning (DL) Libraries

GPU-accelerated Libraries for Deep Learning (DL) applications that leverage CUDA and specialized hardware components of GPUs.

- **NVIDIA cuDNN:** GPU-accelerated library of primitives for deep neural networks
- **NVIDIA TensorRT™:** DL inference optimizer and runtime for production deployment
- **NVIDIA Jarvis:** To develop engaging and contextual AI-powered conversation apps

Partner Libraries

GPU-accelerated libraries that have partnered with NVIDIA. Some of the libraries are:

- **OpenCV:** Library for computer vision, image processing, and machine learning.
- **FFmpeg:** Multimedia framework with a library of plugins for audio and video processing.
- **ArrayFire:** GPU-accelerated open source library for matrix, signal, and image processing.